CLAIMS

What is claimed:

1. A gasification system comprising:
    a. a gasification reactor chamber, the gasification reactor chamber configured to receive and gasify a plurality of feed stock material to produce a heavy vapor fuel gas;
    b. an aspirator assembly operably connected to the gasification reactor chamber, the aspirator assembly having a gas siphon assembly and an impeller;
    c. a flare assembly operably connected to the aspirator assembly, the flare assembly configured to receive a mixed gas from the aspirator assembly and to combust the mixed gas; and
    d. at least one heat recovery device operably connected to the flare assembly, the at least one heat recovery device configured to utilize thermal energy produced by the combustion of the mixed gas.

2. The invention of claim 1 wherein the at least one heat recovery device includes a primary heat recovery device and a secondary heat recovery device, the primary heat recovery device being operably attached to the flare assembly, the secondary heat recovery device being configured to receive exhaust from the primary heat recovery device.

3. The invention of claim 1 including an absorber, the absorber being operably connected to at least one of the at least one heat recovery device, the absorber configured to produce a filtered gas.

4. The invention of claim 3, including an extractor positioned to receive the filtered gas, the extractor configured to remove carbon dioxide from the filtered gas and to produce a recycled process gas.

5. The invention of claim 4, including a return air line, the return air line operably configured to allow for the passage of the recycled process gas from the extractor to the gasification reactor chamber.

6. The invention of claim 1, including at least one perforated conduit, at least a portion of the perforated conduit being located inside the gasification reactor chamber,

the perforated conduit being configured to transport a gasification process gas to the plurality of feed stock material.

7. A gasification reactor chamber comprising:

   a. an interior chamber, the interior chamber having a top, a bottom, and a plurality of sidewalls, the interior chamber configured to receive and gasify a plurality of feed stock material;

   b. an outer shell, the outer shell configured to encompass at least a portion of the plurality of sidewalls and at least a potion of the top of the interior chamber;

   c. at least one layer of insulative material, the at least one layer of insulative material being operably positioned between the plurality of sidewalls and the outer shell;

   d. at least one burner, the at least one burner operably connected to the interior chamber;

   e. a plurality of process gas inlets operably connected to the interior chamber, at least two of the plurality of process gas inlets configured to share a manifold, the manifold configured to allow the flow of gasification process gas through the plurality of process gas inlets;

   f. at least one vent, the at least one vent operably connected to the outer shell, the at least one vent configured to allow the passage of ambient air between the outer shell and the plurality of sidewalls;

   g. at least one access loading door operably connected to the gasification reactor chamber; and

   h. at least one disposal opening operably connected to the gasification reactor chamber.

8. The invention of claim 7, wherein the interior chamber has at least five sidewalls.

9. The invention of claim 7, wherein the plurality of sidewalls form a cylinder.

10. The invention of claim 7, including at least one perforated conduit, at least a portion of the perforated conduit being located inside the interior chamber, the perforated conduit being configured to transport a gasification process gas to the plurality of feed stock material.

11. The invention of claim 7, wherein the interior chamber is operably connected to a return air line, the return air line being configured to transport a plurality of recycled process gas.

12. The invention of claim 7, wherein the interior chamber includes at least one inclined surface, the at least one inclined surface having a first portion and a second portion, the first portion being operably connected to the plurality of sidewalls, the at least one inclined surface having an inward inclination from the first portion toward the second portion, the second portion being operably connected to at least one of the at least one disposal opening.

13. A gasification system comprising:

a. a gasification reactor chamber, the gasification reactor chamber configured to receive and gasify a plurality of feed stock material to produce a heavy vapor fuel gas;

b. an extractor assembly, the extractor assembly configured to extract the heavy vapor fuel gas from the gasification reactor chamber and to mix the heavy vapor fuel gas with oxygen to produce a mixed gas;

c. a flare assembly operably connected to the extractor assembly, the flare assembly including a targeting nozzle, a housing, at least one burner, and an inlet;

d. at least one heat recovery device operably connected to the flare assembly, the at least one heat recovery device configured to utilize the combustion of the mixed air.

14. The invention of claim 13, wherein the targeting nozzle has a conical funnel configuration shaped to direct the flow of the mixed gas through the inlet to a combustion focus point, the at least one burner positioned to combust the flow of the mixed gas at the combustion focus point; and

15. The invention of claim 13, wherein the flare assembly is built into at least one of the at least one heat recovery device.

16. The invention of claim 13, wherein the combustion of the heavy vapor fuel gas is used to operate the at least one heat recovery device.

17. The invention of claim 13, wherein the flare assembly produces a combusted hot heavy vapor fuel gas, the combusted hot heavy vapor fuel gas being delivered from the flare assembly to the at least one heat recovery device, the at least one heat recovery device configured to utilize the thermal energy entrained in the combusted hot heavy vapor fuel gas.

18. A gasification reactor chamber for the gasification of a plurality of feed stock material comprising:

a. an interior chamber, the interior chamber having a top, a bottom, and a plurality of sidewalls, the interior chamber configured to receive and gasify a plurality of feed stock material;

b. an outer shell, the outer shell configured to encompass at least a portion the plurality of sidewalls and at least a portion of the top of the interior chamber;

c. at least one layer of insulative material, the at least one layer of insulative material operably positioned between the plurality of sidewalls and the outer shell;

d. a plurality of process gas inlets operably connected to the interior chamber, at least two of the plurality of process gas inlets configured to share a manifold, the manifold configured to allow the flow of a gasification process gas through the plurality of process gas inlets;

e. a perforated grate operably positioned inside the interior chamber;

f. at least one perforated conduit operably positioned within the interior chamber, the at least one perforated conduit configured to expose the gasification process gas to at least a portion of the surface of the plurality of feed sock material;

g. at least one access loading door operably connected to the gasification reactor chamber;

h. at least one disposal opening operably connected to the gasification reactor chamber; and

i. at least one burner operably connected to the interior chamber.

19. The invention of claim 18, wherein the at least one perforated conduit is an inner lining.

20. The invention of claim 18, wherein the interior chamber includes at least one inclined surface, the at least one inclined surface having a first portion and a second portion, the first portion being operably connected to the plurality of sidewalls, the at least one inclined surface having an inward inclination from the first portion toward the second portion, the second portion being operably connected to at least one of the at least one disposal opening.

21. The invention of claim 18, wherein the plurality of sidewalls is comprised of at least five sidewalls.

22. The invention of claim 18, wherein the plurality of sidewalls form a cylinder.

23. The invention of claim 18, wherein the interior chamber includes a liner, the liner being configured to permit the transport of a gasification process gas to al least a portion of the feed stock material

24. A closed-loop municipal solid waste gasification system for the gasification of a plurality of feed stock material comprising:

a. a gasification reactor chamber;
b. an aspirator assembly operably connected to the gasification reactor chamber, the aspirator assembly including a conduit coupling, an impeller, and a motor;
c. a flare assembly operably connected to the aspirator assembly, the flare assembly including at least one burner;
d. at least one heat recovery device operably connected to the flare assembly;
e. an absorber operably connected to at least one of the at least one heat recovery device, the absorber configured to produce a filtered exhaust;
f. an extractor operably connected to the absorber, the extractor configured to remove a plurality of a carbon dioxide molecules from the filtered exhaust and to produce a recycled process gas; and
g. a return line operably connected to the extractor and the gasification reactor chamber, the return line configured to allow the passage of the recycled process gas from the extractor to the gasification reactor chamber.

25. The system of claim 24, wherein the at least one heat recovery device includes a reverse chiller refrigeration system.

26. The system of claim 24, including a geothermal field, the geothermal field comprised of at least one inlet tube, an induced draft fan, at least one ventilation tube, and a geothermal loop, the at least one inlet being operably connected to at least one of the at least one heat recovery device.

27. The system of claim 24, wherein the gasification reactor chamber is comprised of an interior chamber and an outer shell.

28. The system of claim 27, wherein the interior chamber includes at least one perforated conduit, the perforated conduit configured to transport a gasification process gas to at least a portion of the plurality of feed stock material.

29. The system of claim 27, wherein the interior chamber has at an inner liner, the inner liner configured to permit the transport of a gasification process gas to at least a portion of the plurality of feed stock material.

30. The system of claim 24, wherein the extractor is operably connected to a greenhouse.

31. The system of claim 24, wherein the flare assembly includes a targeting nozzle, the targeting nozzle having a conical funnel configuration, the conical funnel configuration being configured to restrict the flow of a mixed gas into a combustion focus point.

32. The system of claim 27, wherein the interior chamber has at least five sidewalls.

33. The system of claim 27, wherein the interior chamber has an outer surface, the outer surface being operably attached to a plurality of cooling fins, the plurality of cooling fins being configured to remove heat away from the interior chamber.

34. The system of claim 24, including at least one process gas inlet, the at least one process gas inlet configured to control the flow of a gasification process gas into the gasification reactor chamber.

35. The system of claim 34, wherein a process logic controller is operably connected to the at least one process gas inlet, the process logic controller configured to control the flow of the gasification process gas through the at least one process gas inlet and into the gasification reactor chamber.

36. The system of claim 24, wherein the extractor is a greenhouse.

37. The system of claim 24, wherein the extractor is a carbon dioxide dispersal system.

38. The system of claim 27, wherein the interior chamber has a cylindrical configuration.

39. The system of claim 24, wherein the absorber is a chilled radiator.

40. A closed-loop municipal solid waste gasification system comprising:

a. a gasification reactor chamber configured to receive and gasify a plurality of feed stock material, the gasification reactor chamber having an interior chamber and an outer chamber, the interior chamber having an outer surface, the outer surface including a plurality of cooling fins, the outer chamber having at least one vent;

b. at least one layer of insulative material, a portion of the at least one layer of insulative material being positioned between the interior chamber and the outer chamber;

c. an aspirator assembly operably connected to the gasification reactor chamber, the aspirator assembly including a conduit coupling, an impeller, a motor, and a gas siphon assembly;

d. a flare assembly operably connected to the aspirator assembly, the flare assembly including at least one burner and a targeting nozzle;

e. at least one heat recovery device operably connected to the flare assembly;

f. an absorber operably connected to the at least one heat recovery device, the absorber configured to produce a filtered exhaust; and

g. an extractor operably connected to the absorber, the extractor configured to remove at least a portion of carbon dioxide molecules from the filtered exhaust and to produce a recycled process gas.

41. The system of claim 40, including a return line operably configured to return at least a portion of the recycled process gas from the extractor to the gasification reactor chamber.

42. The system of claim 40, wherein the at least one heat recovery device includes a reverse chiller refrigeration system.

43. The system of claim 40, including a geothermal field, the geothermal field comprised of at least one inlet tube, an induced draft fan, at least one ventilation tube, and a geothermal loop, the at least one inlet operably connected to at least one of the at least one heat recovery device.

44. The system of claim 40, wherein the interior chamber includes at least one perforated conduit, the perforated conduit configured to transport gasification process gas to the plurality of feed stock material.

45. The system of claim 40, wherein the interior chamber includes an inner liner, the inner liner configured to permit the transport of recycled process gas to the plurality of feed stock material.

46. The system of claim 40, wherein the extractor is operably connected to a greenhouse.

47. The system of claim 40, wherein the interior chamber has at least five sidewalls.

48. The system of claim 40, including at least one process gas inlet, the at least one process gas inlet configured to allow the flow of a gasification process gas into the interior chamber.

49. The system of claim 48, whereby a process logic controller is operably connected to the at least one process gas inlet, the process logic controller configured to control the flow of the gasification process gas through the at least one process gas inlet and into the gasification reactor chamber.

50. The system of claim 40, wherein the extractor is a greenhouse.

51. The system of claim 40, wherein the extractor is a carbon dioxide dispersal system.

52. The system of claim 40, wherein the interior chamber has a cylindrical configuration.

53. The system of claim 40, wherein the absorber is a chilled radiator.

54. A method for the gasification of solid municipal waste comprising;

a. loading a plurality of feed stock material into a gasification reactor chamber;
b. gasifying at least a portion of the plurality of feed stock material into a heavy vapor fuel gas;
c. extracting the heavy vapor fuel gas from the gasification reactor chamber;
d. mixing the heavy vapor fuel gas with ambient air to produce a mixed gas;
e. combusting the mixed gas to create a combusted gas;
f. recovering the thermal energy entrained in the combusted gas to create an ambient temperature exhaust;
g. filtering the ambient temperature exhaust; and
h. extracting a carbon dioxide gas from the ambient temperature exhaust to create a recycled process gas.

55. The method claim of 54, including the step of returning the recycled process gas to the gasification reactor chamber.

56. The method claim of 54, including venting the extracted carbon dioxide gas into a greenhouse to produce a recaptured gas.

57. The method claim of 56, including venting the recaptured gas into the gasification reactor chamber.

58. The method claim of 54, wherein the recovering step includes submerging the combusted gas in a geothermal field.

59. The method of claim 54 including releasing the extracted carbon dioxide in a carbon dioxide dispersal system.